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Introduction

Observer coverage of the Florida-Georgia shark gillnet fishery began in 1992, and has since documented the many changes to effort, gear characteristics, and target species the fishery has undergone following the implementation of multiple fisheries regulations (e.g. Carlson and Bethea 2007 and references therein, Passerotti and Carlson 2009). Most recently, the directed large coastal shark (LCS) gillnet fishery has been significantly reduced since the implementation of Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan (NMFS 2007). The 33-head LCS trip limit implemented by Amendment 2 has essentially ended the strike net fishery and limited the number of fishers targeting LCS with drift gillnet gear. This regulation has also limited the small coastal shark gillnet fishery. Currently, there are a total of 222 directed and 276 incidental shark permits issued to fishers in the US Atlantic and Gulf of Mexico, of which only a small portion use gillnet gear. Many gillnet fishers have now begun targeting teleost species such as Spanish mackerel *Scomberomorus maculatus*, king mackerel *Scomberomorus cavalla*, and bluefish *Pomatomus saltatrix*, with varying types of gillnet gear. As such, the southeast gillnet observer program currently covers all anchored (sink, stab, set), strike, or drift gillnet fishing by vessels that fish from Florida to North Carolina and in the Gulf of Mexico year-round.

Herein, we summarize fishing effort, catch and bycatch in these fisheries during January 2009 - December 2009, collectively referred to as ‘2009’.

Methods

Observer protocol

Vessels were selected on a quarterly basis (January, April, July, and September) randomly from a pool of vessels that had either a current directed or incidental shark fishing permit and reported fishing with gillnet gear during the previous year. Selection letters notifying permit holders of required observer coverage were issued via U.S. Certified mail approximately one month prior to the upcoming selection period. Receipt of selection letters was confirmed via signature upon acceptance by the permit holder or their proxy. Once the permit holder received the selection letter, he or she was required to make contact with the observer coordinator and indicate intent to fish during the upcoming selection period. Contact was usually made by phone, and the observer coordinator gathered information concerning the vessel's name, captain, contact persons and phone numbers, communications and safety equipment available aboard the vessel, and information about the vessel's location, dates, and times of departure and return. Additional information collected included whether the vessel was active in another fishery, under repair, or no longer fishing. Upon notification of the intention to fish, the observer coordinator deployed an observer to the reported port of departure of permit holder's vessel. As trips are generally daily, the observer remained assigned to the vessel for up to 14 days to attain a sufficient level of coverage.

Observations were made as the net was hauled aboard. The observer remained on the deck of the vessel in a position with an unobstructed view and recorded species and numbers caught. When species identification was questionable, the crew stopped hauling so that the observer could examine the animal(s) for positive identification. Disposition of each species brought onboard was recorded as kept, discarded alive, or discarded dead. When time permitted after the haulback was complete, observers randomly measured 10 individuals from each species caught while the vessel was returning to port. Fork length (FL, measured on a straight line) in

cm and sex (sharks only) were determined when possible. Biological samples (e.g. otoliths, vertebrae, reproductive organs, stomach) were removed and placed on ice after collection. Data were submitted to the NMFS Southeast Fisheries Science Center (SEFSC), Panama City staff on a weekly basis. The data were entered and proofed by SEFSC staff, examined by NMFS/SEFSC Sustainable Fisheries Division staff, and reviewed with observer contract staff to resolve any questions.

Results

A total of 421 sets comprising various gillnet fisheries were observed in 2009. Set locations ranged from North Carolina to the Florida Keys in the Atlantic Ocean, as well as in the northern Gulf of Mexico (Figures 1-3). However, location-specific reports of trips cannot be documented herein due to vessel confidentiality laws, therefore observations will be summarized by gear type.

Drift gillnet fishery

A total of 12 drift gillnet vessels were observed making 225 sets on 43 trips in 2009. Vessels targeted one or more of the following species: Spanish mackerel, king mackerel, or small coastal shark species including blacknose *Carcharhinus acronotus*, Atlantic sharpnose *Rhizoprionodon terraenovae*, and finetooth *Carcharhinus isodon*, sharks. Refinement of the data by target species was not possible due to violation of vessel confidentiality. The spatial distribution of observed drift gillnet fishing effort is illustrated in Figure 1. The lengths of the nets on drift net vessels for all targets ranged from 274 – 2103 m (900-6900 ft), with net depths of 2.4 – 11.0 m (8 – 36 ft). Mesh sizes ranged from 7.9 – 22.9 cm (3.1 – 9.0 in). The average set

time was 0.10 hr (0.09 S.D.), and haul time was 0.52 hr (0.54 S.D.). The total process, from the time that the net went in the water until the haul back was completed, averaged 2.15 hr (3.39 S.D.).

Observed drift gillnet catches

Total observed catch composition for all drift sets was 92.4 % teleosts, 6.8 % shark, and 0.5 % non-shark elasmobranchs (Table 1). Three interactions with protected resources accounted for 0.01% of the catch. Three species of sharks made up 85.4 % (by number) of the total observed shark catch: Atlantic sharpnose shark (33.5 %), blacknose shark (28.5 %) and smooth dogfish, *Mustelus canis* (23.4 %). Composition of shark catch by weight was similar, composed of blacknose shark (41.1 %), followed by smooth dogfish (22.1 %), and Atlantic sharpnose shark (13.7 %). Four species of teleosts made up approximately 91 % by number of the overall teleost catch. These species were Spanish mackerel (65.2 %), butterfish *Peprilus triacanthus* (9.8 %), Atlantic menhaden *Brevoortia tyrannus* (8.7 %), and bluefish (7.7%).

Strike gillnet fishery

Three vessels making a total of 4 trips and 6 sets were observed fishing gillnets in a strike fashion in 2009. Target species included king mackerel, Spanish mackerel, and blacktip shark *Carcharhinus limbatus*. Refinement of the data by target species was not possible due to violation of vessel confidentiality. Historically, strike netting for sharks occurs predominately in winter when the vessels target schools of blacktip sharks off the east coast of Florida (Carlson and Bethea, 2007 and references therein). Shark-directed strike effort in 2009 was low mainly because of the reduced trip limits for LCS imposed by Amendment 2 to the Consolidated

Atlantic Highly Migratory Species Fishery Management Plan (NMFS 2007), as fishers found the practice to be cost-prohibitive given the trip limits (J. Parks, A. de Ron Santiago, personal communications).

Areas of observed strike gillnet fishing effort are illustrated in Figure 2. Nets used for striking ranged in length from 365.8 – 548.6 m (1200 – 1800 ft) with net depths of 18.3 – 27.4 m (60 – 90 ft) and mesh sizes of 11.4 – 17.8 cm (4.5 – 7 in). Average set time was 0.12 hr (0.07 S.D.) and average haul time was 0.96 hr (0.76 S.D.). Total time for the entire process, from start of set to end of haulback, averaged 2.13 hr (2.15 S.D.).

Observed strike gillnet catches

Total observed catch composition for all strike sets was 99.5 % teleosts and 0.5 % sharks. There were no interactions with protected resources. Teleost catch was almost exclusively king mackerel (99.9 %) by number (Table 2). Shark catch was small and was made up of blacktip shark (60 %), Atlantic sharpnose shark (33.3 %) and bull shark, *Carcharhinus leucas* (6.7 %) by number. By weight, blacktip shark made up 71.5 % of the shark catch, while bull sharks comprised 21.9 % and Atlantic sharpnose shark made up 6.7 %.

Sink gillnet fishery

A total of 38 trips making 190 sink net sets on 14 vessels were observed in 2009. Trips were made targeting one or more of the following species: shark, Spanish mackerel, king mackerel, Southern kingfish, *Menticirrhus americanus*, Atlantic croaker *Micropogonias undulatus*, bluefish, weakfish *Cynoscion regalis*, blacknose shark, and finetooth shark.

Refinement of the data by target species was not possible due to violation of vessel confidentiality. Areas of observed sink gillnet fishing effort are illustrated in Figure 3.

For all targets, sink gillnet vessels fished with nets ranging 22.9 – 914.4 m (75 - 3000 ft) long, net depths of 2.7 – 8.5 m (9 – 28 ft) and stretched mesh sizes 6.4 – 20.3 cm (2.5 - 8 in). Set duration averaged 0.14 hr (0.48 S.D.). Hauls averaged 0.64 hr (0.60 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 1.09 hr (3.56 S.D.). Sets were made in waters averaging 21.4 m (14.9 S.D.) deep.

Observed sink gillnet catches

Catch composition by number of all sets for all targets was 85.8 % teleosts, 13.4 % shark, 0.75 % invertebrates and 0.3 % non-shark elasmobranchs (Table 3). One interaction with a protected resource totaled 0.002 % of the total catch. By number, shark catch was primarily spiny dogfish *Squalus acanthias* (29.9 %), Atlantic sharpnose shark (25.7 %), smooth dogfish (15.3 %), and finetooth shark (12.9 %). By weight the shark catch was similar and made up mostly of smooth dogfish (25.2 %), followed by spiny dogfish (23.3 %), Atlantic sharpnose shark (13.6 %), and finetooth shark (10.8 %). Atlantic croaker made up 27.7 % of the teleost catch by number, followed by Spanish mackerel (19.3 %), bluefish (12.7 %), Atlantic bumper *Chloroscombrus chrysurus* (12.1 %), blue runner *Caranx chrysos* (9.4 %), and spot *Leiostomus xanthurus* (9.2 %).

Average size

The average (S.D.) lengths of sharks measured by gear type can be found in Table 4. Average (S.D.) fork lengths of sharks caught in the drift gillnet fishery ranged from 62.1 cm

(18.3) for Atlantic sharpnose sharks to 99.6 cm (8.7) for smooth hammerhead sharks, *Sphyrna zygaena*. Observed strike sets resulted in measurements ranging from 71.2 cm (6.6) for Atlantic sharpnose shark to 179 cm (0.0) for bull shark. Average (S.D.) fork lengths of sharks caught in the sink gillnet fishery ranged from 62.3 cm (8.3) for sandbar sharks *Carcharhinus plumbeus* to 94.5 cm (9.9) for smooth dogfish.

Average (S.D.) lengths of teleosts ($n > 5$) measured by gear type can be found in Table 5. Average (S.D.) fork lengths of teleosts caught in the drift gillnet fishery ranged from 14.4 cm (2.2) for banded drum *Larimus fasciatus* to 94.8 cm (13.6 S.D.) for black drum *Pogonias cromis*. King mackerel were also the only species measured in the strike gillnet fishery, with average fork length of 82.0 cm (18.8). Average (S.D.) fork lengths of teleosts caught in the sink gillnet fishery ranged from 13.9 cm (2.0) for silver porgy *Diplodus argenteus* to 86.0 cm (9.4) for king mackerel.

Protected resources interactions

A total of four interactions with protected resources were documented over 421 sets observed in 2009, comprising 0.006% of the catch. One loggerhead turtle *Caretta caretta*, one Kemp's ridley turtle *Lepidochelys kempii*, and one bottlenose dolphin *Turciops truncatus*, were caught on three separate vessels fishing with drift gillnet gear. Additionally, one dovekie *Alle alle*, was caught on a vessel fishing with sink gillnet gear. The bird and two turtles were released alive and the dolphin was released dead (Table 6).

Discussion

Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan (NMFS 2007) has had a large impact on the shark gillnet fishery. There was a drastic reduction in the number of directed shark trips observed in 2009 as compared with years past, as most fishers found the overhead costs were too high given the 33-head LCS trip limit. More effort was instead concentrated in the small coastal shark fishery, as well as those targeting teleost species (Spanish mackerel, bluefish, etc.). Further reduction of shark gillnet effort could occur if the preferred alternative proposed in Amendment 3 to the HMS FMP is adopted. Landing of small coastal sharks is currently prohibited pending final legislation on Amendment 3, which will likely have significant impacts on shark gillnet effort for 2010 as well.

Despite reductions in shark targeted gillnet effort, observations of the southeast US gillnet fishery were nearly doubled in 2009 over previous years. The scope of observer coverage will continue to change in response to the dynamics of the gillnet fishery, regardless of target. Continued fisheries monitoring will contribute to a better understanding of the impacts on all marine resources.

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Table 1. Total drift gillnet catch by species and species disposition in order of decreasing abundance for all observed trips, 2009. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Scomberomorus maculatus</i>	Spanish mackerel	12637	98.9	0.0	1.1
<i>Peprilus triacanthus</i>	Butterfish	1906	98.6	0.2	1.3
<i>Brevoortia tyrannus</i>	Atlantic menhaden	1679	25.1	6.6	68.3
<i>Pomatomus saltatrix</i>	Bluefish	1499	79.6	1.3	19.1
<i>Peprilus alepidotus</i>	Harvestfish	549	97.3	0.5	2.2
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	481	19.1	72.1	8.7
<i>Carcharhinus acronotus</i>	Blacknose shark	408	91.7	8.3	0.0
<i>Mustelus canis</i>	Smooth dogfish	336	37.8	60.1	2.1
<i>Opisthonema oglinum</i>	Atlantic thread herring	264	0.0	0.4	99.6
<i>Brevoortia patronus</i>	Gulf menhaden	136	95.6	0.0	4.4
<i>Scomberomorus cavalla</i>	King mackerel	132	81.8	0.0	18.2
<i>Rachycentron canadum</i>	Cobia	113	18.6	47.8	33.6
<i>Carcharhinus plumbeus</i>	Sandbar shark	107	0.0	81.3	18.7
<i>Auxis thaza</i>	Frigate mackerel	83	98.8	0.0	1.2
<i>Larimus fasciatus</i>	Banded drum	70	0.0	8.6	91.4
<i>Carcharhinus limbatus</i>	Blacktip shark	52	13.5	40.4	46.2
<i>Callinectes sapidus</i>	Blue crab	51	0.0	88.2	11.8
<i>Cynoscion regalis</i>	Weakfish	45	13.3	2.2	84.4
<i>Rhinoptera bonasus</i>	Cownose ray	43	0.0	97.7	2.3
<i>Euthynnus alletteratus</i>	Little tunny	35	100.0	0.0	0.0
<i>Chaetodipturus faber</i>	Spadefish	34	11.8	67.6	20.6
<i>Paralichthys sp.</i>	Flounder	34	2.9	79.4	17.6
<i>Raja eglanteria</i>	Clearnose skate	34	0.0	100.0	0.0
<i>Selene vomer</i>	Lookdown	28	0.0	46.4	53.6
<i>Trachinotus carolinus</i>	Florida pompano	26	92.3	0.0	7.7
<i>Paralichthys dentatus</i>	Summer flounder	18	5.6	88.9	5.6
<i>Caranx hippos</i>	Crevalle jack	16	87.5	0.0	12.5
<i>Scyphozoa</i>	Jellyfish family	16	0.0	0.0	100.0
<i>Elops saurus</i>	Ladyfish	15	6.7	0.0	93.3
	Smooth hammerhead				
<i>Sphyrna zygaena</i>	shark	14	71.4	28.6	0.0
<i>Sphyrna tiburo</i>	Bonnethead shark	13	76.9	15.4	7.7
<i>Micropogonias undulatus</i>	Atlantic croaker	12	16.7	33.3	50.0
<i>Carcharhinus brevipinna</i>	Spinner shark	10	40.0	50.0	10.0
<i>Pogonias cromis</i>	Black drum	9	100.0	0.0	0.0

<i>Dasyatis centroura</i>	Roughtail stingray	7	0.0	100.0	0.0
<i>Manta birostris</i>	Manta ray	6	0.0	100.0	0.0
<i>Sarda sarda</i>	Bonito	6	100.0	0.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	6	100.0	0.0	0.0
<i>Menticirrhus sp.</i>	Kingfish	4	0.0	0.0	100.0
<i>Prionotus sp.</i>	Sea robin	4	0.0	100.0	0.0
<i>Sciaenops ocellatus</i>	Red drum	4	0.0	100.0	0.0
<i>Dasyatis americana</i>	Southern stingray	3	0.0	100.0	0.0
<i>Dasyatis sabina</i>	Atlantic stingray	3	0.0	100.0	0.0
<i>Leiostomus xanthurus</i>	Spot	3	33.3	0.0	66.7
<i>Limulus polyphemus</i>	Horseshoe crab	3	0.0	100.0	0.0
<i>Remora remora</i>	Remora	3	0.0	100.0	0.0
<i>Synodus foetens</i>	Inshore lizardfish	3	0.0	0.0	100.0
<i>Alopias vulpinus</i>	Common thresher shark	3	100.0	0.0	0.0
<i>Gymnura sp.</i>	Butterfly ray	2	0.0	100.0	0.0
<i>Lepisosteidae</i>	Gar family	2	50.0	50.0	0.0
<i>Paralichthys lethostigma</i>	Southern flounder	2	0.0	100.0	0.0
<i>Penaeidae</i>	Penaeid shrimp family	2	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	100.0	0.0	0.0
<i>Carangidae</i>	Jack family	1	100.0	0.0	0.0
<i>Catherines macrocerus</i>	Whitespotted filefish	1	0.0	100.0	0.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	1	0.0	100.0	0.0
<i>Diodontidae</i>	Spiny puffer family	1	0.0	100.0	0.0
<i>Lobotes surinamensis</i>	Tripletail	1	100.0	0.0	0.0
<i>Menticirrhus americanus</i>	Southern kingfish	1	100.0	0.0	0.0
<i>Menticirrhus saxatilis</i>	Northern kingfish	1	100.0	0.0	0.0
<i>Myliobatis freminvillei</i>	Bullnose ray	1	0.0	100.0	0.0
<i>Sphyrna barracuda</i>	Great barracuda	1	100.0	0.0	0.0
<i>Tetraodontidae</i>	Puffer family	1	0.0	100.0	0.0
<i>Trachinocephalus myops</i>	Snakefish	1	0.0	100.0	0.0
<i>Tylosurus crocodilus</i>	Houndfish	1	100.0	0.0	0.0
<i>Carcharhinus isodon</i>	Finetooth shark	1	100.0	0.0	0.0
<i>Carcharhinus obscurus</i>	Dusky shark	1	0.0	100.0	0.0
<i>Carcharias taurus</i>	Sand tiger shark	1	0.0	100.0	0.0
<i>Squatina dumeril</i>	Atlantic angel shark	1	0.0	100.0	0.0

Table 2. Total strike gillnet catch by species and species disposition in order of decreasing abundance for all observed trips, 2009. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Scomberomorus cavalla</i>	King mackerel	2972	100	0	0
<i>Carcharhinus limbatus</i>	Blacktip shark	9	100	0	0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	5	0	0	100
<i>Scomberomorus maculatus</i>	Spanish mackerel	2	100	0	0
<i>Carcharhinus leucas</i>	Bull shark	1	100	0	0
<i>Paralichthys</i> sp.	Flounder	1	0	100	0
<i>Menticirrhus</i> sp.	Kingfish	1	100	0	0

Table 3. Total sink gillnet catch by species and species disposition in order of decreasing abundance for all observed trips, 2009. Catch disposition is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Micropogonias undulatus</i>	Atlantic croaker	10060	10056	4	0
<i>Scomberomorus maculatus</i>	Spanish mackerel	7003	6903	0	100
<i>Pomatomus saltatrix</i>	Bluefish	4597	4491	15	91
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	4383	3154	538	691
<i>Caranx chrysos</i>	Blue runner	3422	3380	0	42
<i>Leiostomus xanthurus</i>	Spot	3353	3287	4	62
<i>Squalus acanthias</i>	Spiny dogfish	1693	0	1693	0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	1456	964	212	280
<i>Mustelus canis</i>	Smooth dogfish	865	862	3	0
<i>Menticirrhus americanus</i>	Southern kingfish	853	840	0	13
<i>Carcharhinus isodon</i>	Finetooth shark	731	729	2	0
<i>Larimus fasciatus</i>	Banded drum	359	0	44	315
<i>Sphyrna tiburo</i>	Bonnethead shark	323	225	60	38
<i>Scyphozoa</i>	Jellyfish family	300	0	0	300
<i>Selene setapinnis</i>	Atlantic moonfish	286	268	1	17
<i>Cynoscion sp</i>	Seatrout	268	256	1	11
<i>Equetus umbrosus</i>	Cubbyu	249	0	0	249
<i>Brevoortia tyrannus</i>	Atlantic menhaden	223	60	0	163
<i>Carcharhinus acronotus</i>	Blacknose shark	222	217	5	0
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	172	172	0	0
<i>Carcharhinus limbatus</i>	Blacktip shark	160	20	32	108
<i>Sciaenops ocellatus</i>	Red drum	130	0	116	14
<i>Scomberomorus cavalla</i>	King mackerel	119	63	4	52
<i>Peprilus triacanthus</i>	Butterfish	117	63	0	54
<i>Carcharhinus plumbeus</i>	Sandbar shark	95	0	60	35
<i>Caranx hippos</i>	Crevale jack	93	93	0	0
<i>Sphyrna lewini</i>	Scalloped hammerhead	90	67	8	15
<i>Rachycentron canadum</i>	Cobia	82	2	51	29
<i>Menticirrhus sp.</i>	Kingfish	53	53	0	0
<i>Bagre marinus</i>	Gafftopsail catfish	51	2	34	15
<i>Brevoortia smithi</i>	Yellowfin menhaden	51	0	8	43
<i>Euthynnus alletteratus</i>	Little tunny	42	42	0	0
<i>Archosargus probatocephalus</i>	Sheepshead	37	37	0	0
<i>Brevoortia patronus</i>	Gulf menhaden	36	35	0	1
<i>Menticirrhus littoralis</i>	Gulf kingfish	27	27	0	0
<i>Peprilus alepidotus</i>	Harvestfish	26	25	0	1
<i>Sarda sarda</i>	Bonito	26	26	0	0
<i>Trachinotus falcatus</i>	Permit	23	0	23	0
<i>Lutjanus campechanus</i>	Red snapper	22	0	8	14

<i>Carcharhinus brevipinna</i>	Spinner shark	18	18	0	0
<i>Brevoortia sp</i>	Menhaden	17	14	0	3
<i>Pogonias cromis</i>	Black drum	16	16	0	0
<i>Diplodus argenteus</i>	Silver porgy	11	6	0	5
<i>Asteroridae</i>	Sea star family	9	0	7	2
<i>Balistidae</i>	Leatherjacket family	9	0	9	0
<i>Sphyrna mokarran</i>	Great hammerhead shark	8	0	1	7
<i>Chaetodipturus faber</i>	Spadefish	8	0	3	5
<i>Arius felis</i>	Heardhead catfish	7	0	1	6
<i>Elops saurus</i>	Ladyfish	6	6	0	0
<i>Sparidae</i>	Porgy family	6	5	1	0
<i>Myliobatis freminvillei</i>	Bullnose ray	5	0	5	0
<i>Trachinotus carolinus</i>	Florida pompano	5	1	4	0
<i>Clupeidae</i>	Herring family	4	1	0	3
<i>Paralichthys sp.</i>	Flounder	4	2	2	0
<i>Synodus foetens</i>	Inshore lizardfish	4	0	1	3
<i>Alopias vulpinus</i>	Common thresher shark	3	1	1	1
<i>Carcharhinus leucas</i>	Bull shark	3	3	0	0
<i>Squatina dumeril</i>	Angel shark	3	0	3	0
<i>Calappa flammea</i>	Flame box crab	3	0	3	0
<i>Cynoscion regalis</i>	Weakfish	3	3	0	0
<i>Echeneidae</i>	Remora family	3	0	1	2
<i>Lutjanus griseus</i>	Gray snapper	3	0	0	3
<i>Prionotus sp.</i>	Sea robin	3	0	2	1
<i>Remora remora</i>	Remora	3	0	3	0
<i>Centropristis striata</i>	Black seabass	2	2	0	0
<i>Cynoscion nothus</i>	Silver seatrout	2	2	0	0
<i>Mugil curema</i>	Silver mullet	2	2	0	0
<i>Paralichthys dentatus</i>	Summer flounder	2	0	2	0
<i>Raja eglanteria</i>	Clearnose skate	2	0	2	0
<i>Rhinoptera bonasus</i>	Cownose ray	2	0	2	0
<i>Baslistes capriscus</i>	Gray triggerfish	1	0	1	0
<i>Bramidae</i>	Pomfret family	1	0	1	0
<i>Calamus nodosus</i>	Knobbed porgy	1	1	0	0
<i>Dasyatis centroura</i>	Roughtail stingray	1	0	1	0
<i>Limulus polyphemus</i>	Horseshoe crab	1	0	1	0
<i>Majidae</i>	Spider crab	1	0	1	0
<i>Mollusca</i>	Mollusc	1	0	1	0
<i>Rajiformes</i>	Skates and rays	1	0	1	0
<i>Synodontidae</i>	Lizardfish family	1	0	1	0

Table 4. Average size (fork length, FL) and standard deviation (S.D.) of sharks measured for all observed trips by gear type, 2009.

Gear	Species	Common Name	n	Avg FL (cm)	S.D.
Drift gillnet	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	192	62.1	18.3
	<i>Mustelus canis</i>	Smooth dogfish	87	93.3	20.5
	<i>Carcharhinus plumbeus</i>	Sandbar shark	22	62.9	3.7
	<i>Sphyrna zygaena</i>	Smooth hammerhead shark	13	99.6	8.7
	<i>Carcharhinus limbatus</i>	Blacktip shark	9	89.9	12.3
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	6	91.3	18.6
	<i>Carcharhinus acronotus</i>	Blacknose shark	6	88.3	5.4
	<i>Carcharhinus brevipinna</i>	Spinner shark	5	74.8	13.2
	<i>Sphyrna tiburo</i>	Bonnethead shark	4	75.3	5.4
	<i>Alopias vulpinus</i>	Common thresher shark	3	84.0	12.8
	<i>Carcharhinus obscurus</i>	Dusky shark	1	82.0	
	<i>Carcharhinus isodon</i>	Finetooth shark	1	97.0	
Strike gillnet	<i>Carcharhinus limbatus</i>	Blacktip shark	9	126	9.6
	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	5	71.2	6.6
	<i>Carcharhinus leucas</i>	Bull shark	1	179	
Sink gillnet	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	190	72.1	11.3
	<i>Mustelus canis</i>	Smooth dogfish	120	94.5	9.9
	<i>Carcharhinus isodon</i>	Finetooth shark	103	78.9	16.3
	<i>Carcharhinus acronotus</i>	Blacknose shark	74	87.6	6.7
	<i>Squalus acanthias</i>	Spiny dogfish	67	76.3	8.5
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	56	86.3	12.3
	<i>Sphyrna tiburo</i>	Bonnethead shark	56	74.3	9.6
	<i>Carcharhinus limbatus</i>	Blacktip shark	5	79.4	14.2
	<i>Alopias vulpinus</i>	Common thresher shark	3	82.0	3.6
	<i>Carcharhinus leucas</i>	Bull shark	3	79.7	1.5
	<i>Carcharhinus plumbeus</i>	Sandbar shark	3	62.3	8.3
	<i>Carcharhinus brevipinna</i>	Spinner shark	1	66.0	

Table 5. Average size (fork length, FL) and standard deviation (S.D.) of non-sharks measured for all observed trips by gear type, 2009, where sample size is greater than 5.

Gear	Species	Common Name	n	Avg FL (cm)	S.D.
Drift gillnet	<i>Scomberomorus maculatus</i>	Spanish mackerel	1413	45.2	5.7
	<i>Peprilus triacanthus</i>	Butterfish	410	17.3	2.5
	<i>Pomatomus saltatrix</i>	Bluefish	316	36.5	5.5
	<i>Brevoortia tyrannus</i>	Atlantic menhaden	270	24.0	7.7
	<i>Scomberomorus cavalla</i>	King mackerel	121	80.9	10.7
	<i>Opisthonema oglinum</i>	Atlantic thread herring	82	15.2	1.6
	<i>Rachycentron canadum</i>	Cobia	73	69.0	17.4
	<i>Peprilus alepidotus</i>	Harvestfish	59	16.7	1.6
	<i>Euthynnus alletteratus</i>	Little tunny	35	57.2	4.2
	<i>Auxis thaza</i>	Frigate mackerel	25	32.9	1.9
	<i>Larimus fasciatus</i>	Banded drum	16	14.4	2.2
	<i>Caranx hippos</i>	Crevalle jack	13	26.9	1.8
	<i>Elops saurus</i>	Ladyfish	11	58.0	4.3
	<i>Pogonias cromis</i>	Black drum	9	94.8	13.6
	<i>Selene vomer</i>	Lookdown	9	21.7	1.8
	<i>Trachinotus carolinus</i>	Florida pompano	8	21.8	0.7
Strike gillnet	<i>Scomberomorus cavalla</i>	King mackerel	10	82.0	18.8
Sink gillnet	<i>Pomatomus saltatrix</i>	Bluefish	493	51.7	17.7
	<i>Scomberomorus maculatus</i>	Spanish mackerel	447	44.7	7.7
	<i>Caranx chrysos</i>	Blue runner	264	27.6	3.4
	<i>Menticirrhus americanus</i>	Southern kingfish	167	31.9	4.0
	<i>Micropogonias undulatus</i>	Atlantic croaker	108	31.6	3.4
	<i>Leiostomus xanthurus</i>	Spot	64	19.7	3.6
	<i>Chloroscombrus chrysurus</i>	Atlantic bumper	60	17.8	1.8
	<i>Scomberomorus cavalla</i>	King mackerel	42	86.0	9.4
	<i>Euthynnus alletteratus</i>	Little tunny	30	56.0	2.7
	<i>Equetus umbrosus</i>	Cubby	20	19.8	2.0
	<i>Selene setapinnis</i>	Atlantic moonfish	15	16.9	2.0
	<i>Diplodus argenteus</i>	Silver porgy	11	13.9	2.0
	<i>Caranx hippos</i>	Crevalle jack	10	21.5	6.0
	<i>Cynoscion sp</i>	Seatrout	10	33.3	7.0
	<i>Peprilus triacanthus</i>	Butterfish	9	16.6	3.0
	<i>Pogonias cromis</i>	Black drum	8	61.0	4.6
	<i>Menticirrhus sp.</i>	Kingfish	6	25.5	3.6

Table 6. Protected species interactions in the southeast US gillnet fishery for all observed trips, 2009. Target species are listed as bluefish (BLU), shark (SHX), or Spanish mackerel (SMK).

Species	Landing Date	N Latitude	W Longitude	Disposition	Gear	Target Species
<i>Alle alle</i>	2/9/2009	3536.444	7504.155	Alive, uninjured	Sink gillnet	BLU
<i>Lepidochelys kempii</i>	3/12/2009	3011.103	8813.575	Alive, uninjured	Drift gillnet	SHX
<i>Caretta caretta</i>	6/8/2009	3509.718	7549.501	Alive, uninjured	Drift gillnet	SMK
<i>Tursiops truncatus</i>	10/3/2009	3551.25	7533.224	Dead, fresh	Drift gillnet	SMK

Figure 1. Distribution of observed drift gillnets sets, 2009.

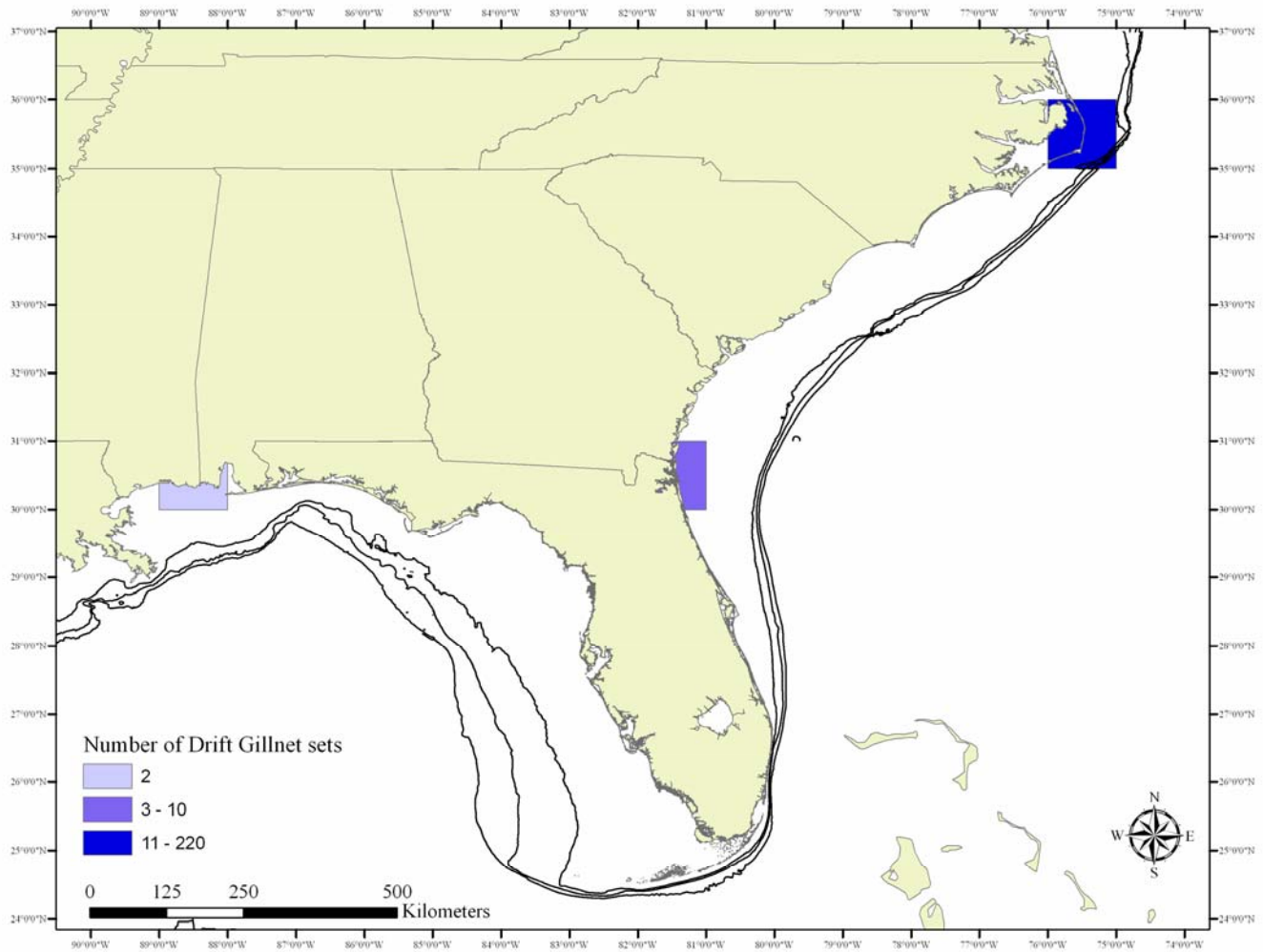


Figure 2. Distribution of observed strike gillnets sets, 2009.

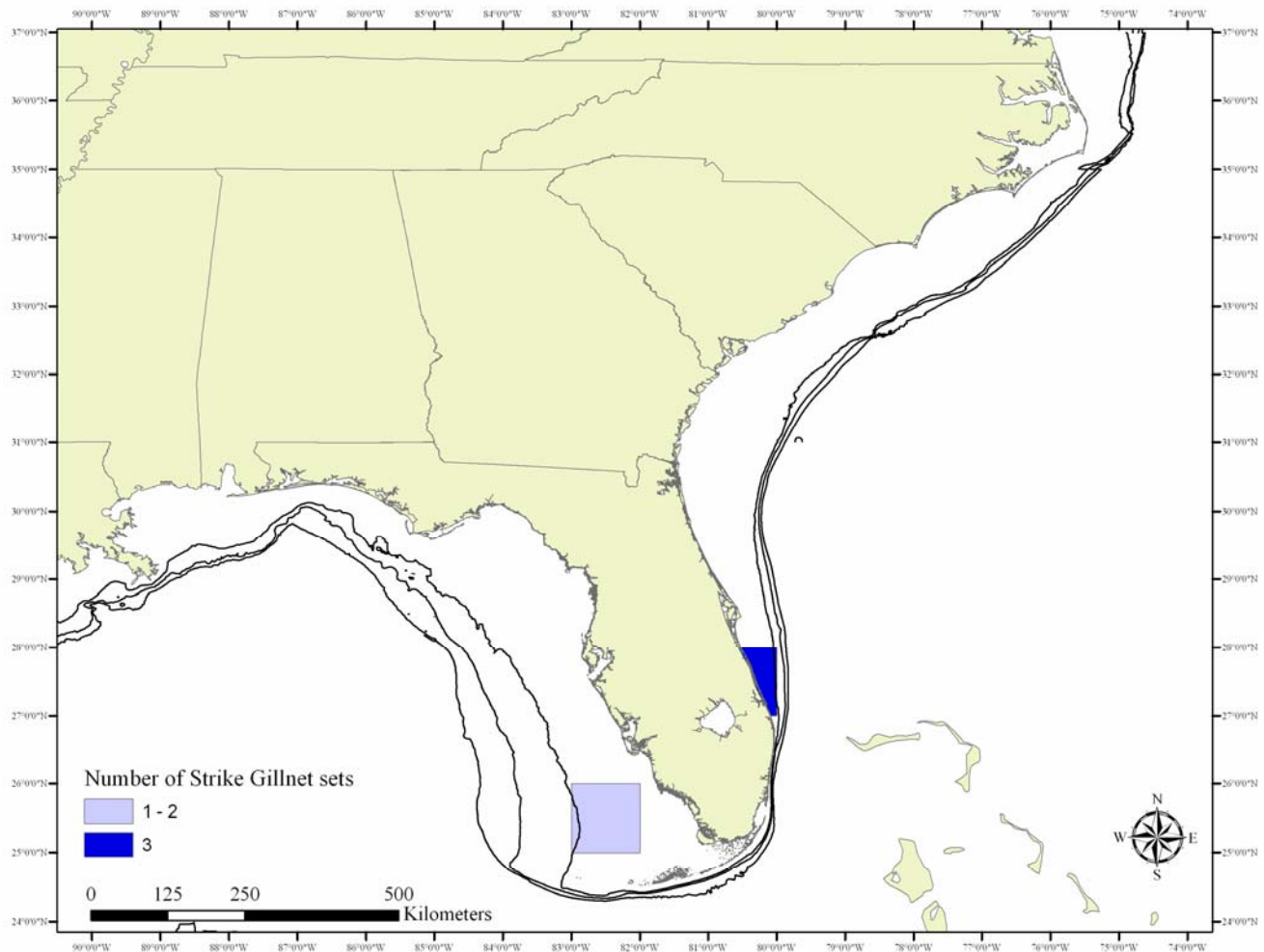


Figure 3. Distribution of observed sink gillnets sets, 2009.

